Amendments to the Claims

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original) A fabricated microstructure comprising:

a plurality of protrusions, each protrusion capable of providing a substantially parallel adhesive force at a surface of between about 60 and 2,000 nano-Newtons;

a flexible shaft to support said protrusions; and

a flexible beam to which said shaft is attached.

2. (Original) The fabricated microstructure of claim 1 wherein there are a plurality of shafts attached to said flexible beam, each of said shafts supporting a plurality of protrusions.

3. (Original) The fabricated microstructure of claim 1 wherein the shaft has a length of less than about 500 microns, and a diameter of between about 0.01 and 0.1 times the length of the shaft.

4. (Original) The fabricated microstructure of claim 3 wherein the shaft has a diameter of about 0.05 times the length of the shaft.

5. (Original) The fabricated microstructure of claim 1 wherein the shaft has a length of between about 10 and 100 microns.

6. (Original) The fabricated microstructure of claim 1 wherein said protrusions adhere to the surface by intermolecular forces.

7. (Original) The fabricated microstructure of claim 1 wherein the flexible beam has a length of between about 1 and 5 centimeters, a width of between about 0.5 and 1 centimeter, and a thickness of between about 0.1 and 0.3 millimeters.

8. (Currently Amended) The fabricated microstructure of claim 1 wherein said flexible beam produces ~~between about 0.01 and 0.10 grams of~~ a preload force while maintaining a substantially parallel alignment of the protrusions with a surface.

9. (Original) A fabricated microstructure comprising:

an array of protrusions, said array having a width less than about ten microns and each protrusion of said array capable of providing an adhesive force at a surface by intermolecular forces;

a shaft to support said array of protrusions; and

a flexible beam to which said shaft is attached.

10. (Original) A fabricated grip comprising:

a lamella from a specimen attached to a flexible beam and configured to engage an item to be manipulated.

11. (Original) The fabricated grip of claim 10 further including a substrate to support an object, said lamella attachable to the substrate to manipulate the object.

12. (Original) A fabricated microstructure comprising:

a shaft with a length of less than about 500 microns, said shaft having a diameter of between about 0.01 and 0.1 times the length of said shaft;

an array of spatulae formed at an end of said shaft, said array of spatulae having a width of less than about ten microns, individual spatula of said array having a terminal end to provide an adhesive force at a surface; and

a flexible beam to which said shaft is attached.

13. (Original) The fabricated microstructure of claim 12 wherein said shaft has a length of between approximately 10 and 100 microns.

14. (Original) The fabricated microstructure of claim 12 wherein said shaft has a diameter of approximately 0.05 times the length of said shaft.

15. (Original) The fabricated microstructure of claim 12 wherein said terminal end has a radius of approximately 2 microns.

16. (Original) The fabricated microstructure of claim 12 wherein the flexible beam has a length of between about 1 and 5 centimeters, a width of between about 0.5 and 1 centimeter, and a thickness of between about 0.1 and 0.3 millimeters.

17. (Currently Amended) The fabricated microstructure of claim 12 wherein said flexible beam produces ~~between about 0.01 and 0.10 gram of~~ a preload force while maintaining a substantially parallel alignment of the array of spatulae with the surface.

18. (Original) The fabricated microstructure of claim 12 wherein said terminal end has a shape selected from the group consisting of a curved segment of a sphere, a flattened segment of a sphere, a sphere and a flattened surface.

19. (Original) A method of forming an adhesive force, said method comprising the steps of:

attaching a seta from a specimen to a flexible beam; and

applying said seta to a surface so as to establish an adhesive force at said surface so the flexible beam can be used to manipulate an object.

20. (Original) The method of claim 19 further including removing a seta from a gecko.

21. (Original) The method of claim 19 further including removing a seta from a living specimen selected from the group consisting of species of *Anolis*, skinks, beetles, and kissing-bugs.

22. (Original) The method of claim 19 wherein said applying step includes the steps of:

applying said seta to said surface with a force perpendicular to said surface; and

pulling said seta with a force parallel to said surface so as to engage said adhesive force.

23. (Original) The method of claim 22 wherein said adhesive force is greater than the cumulative force of said applying and pulling steps.

24. (Currently Amended) A method of establishing an adhesive force, said method comprising the steps of:

using a flexible beam to apply a seta to a surface with a force perpendicular to said surface so as to preload an adhesive force of said seta;

using the flexible beam to orient said seta parallel to said surface; and

using the flexible beam to pull said ~~setae~~seta with a force parallel to said surface.

25. (Original) The method of claim 24 wherein said adhesive force is greater than the cumulative force of said applying and pulling steps.

26. (Original) The method of claim 24 further comprising the step of eliminating said adhesive force by creating a force to produce a detachment angle between said seta and said surface.

27. (Original) The method of claim 26 wherein said eliminating step includes a step of creating a force to produce a detachment angle of between about 25° and 35° between said seta and said surface.

28. (Original) The method of claim 26 wherein said eliminating step includes the step of: creating a force to produce a detachment angle of approximately 30° between said seta and said surface.

29. (Currently Amended) The method of claim 24 wherein said flexible beam produces ~~between about 0.01 and 0.10 gram of~~ a preload force while maintaining a substantially parallel alignment of the seta with the surface.

30. (Original) A method of fabricating an adhesive microstructure, said method comprising the steps of:

fabricating an array of shafts;

forming spatulae on said array of shafts; and

attaching said array of shafts to a flexible member.

31. (Original) The method of claim 30 wherein said forming step includes the step of forming spatulae, wherein the terminal end of individual spatula of said spatulae include an extended surface.

32. (Original) The method of claim 30 wherein said forming step includes the steps of:

constructing spatulae; and

attaching said spatulae to said array of shafts.

33. (Original) A method of fabricating an adhesive microstructure comprising:

contacting a seta of a specimen with a semiconductor substrate and causing relative motion between the seta and the semiconductor substrate to remove the seta from the specimen; and

attaching the removed seta to a flexible beam so the flexible beam can be used to manipulate an object.

34. (Original) The method of claim 33 wherein the semiconductor substrate is a silicon or gallium arsenide wafer.

35. (Original) The method of claim 33 wherein the flexible beam is made from a material selected from the group consisting of acetate, nylon, acrylic, brass and spring steel.

36. (Currently Amended) A method of establishing an adhesive force, said method comprising the steps of:

using a flexible beam to apply a seta to a surface with a force perpendicular to said surface so as to preload an adhesive force of said seta;

using the flexible beam to orient said seta parallel to said surface; and

using the flexible beam to pull said seta at a velocity to increase an adhesive force exerted by said ~~setae~~seta on said surface.

37. (New) A method of establishing an adhesive force, said method comprising the steps of:

using a flexible beam to apply a plurality of protrusions on a supporting structure to a surface with a force perpendicular to said surface so as to preload an adhesive force of said plurality of protrusions;

using the flexible beam to orient said plurality of protrusions parallel to said surface; and

using the flexible beam to pull said plurality of protrusions with a force parallel to said surface.

38. (New) A method of establishing an adhesive force, said method comprising the steps of:

using a flexible beam to apply a plurality of protrusions on a supporting structure to a surface with a force perpendicular to said surface so as to preload an adhesive force of said plurality of protrusions;

using the flexible beam to orient said plurality of protrusions parallel to said surface; and

using the flexible beam to pull said plurality of protrusions at a velocity to increase an adhesive force exerted by said plurality of protrusions on said surface.

39. (New) The method of claims 37 or 38 wherein the supporting structure is a substantially planar substrate.

40. (New) The method of claims 37 or 38 wherein the supporting structure is a shaft.

41. (New) A fabricated microstructure comprising:

a protrusion capable of providing adhesive force at a surface by intermolecular forces;

a supporting structure to support said protrusion; and

a flexible beam attached to said supporting structure.

42. (New) The fabricated microstructure of claim 41 wherein the supporting structure is a substantially planar substrate.

43. (New) The fabricated microstructure of claim 41 wherein the supporting structure is a flexible shaft.

44. (New) The fabricated microstructure of claim 43 wherein there are a plurality of shafts attached to said flexible beam, each of said shafts supporting a plurality of protrusions.

45. (New) The fabricated microstructure of claim 41 wherein said flexible beam produces a preload force while maintaining a substantially parallel alignment of the protrusion with a surface.

46. (New) The fabricated microstructure of claim 41 wherein there are a plurality of protrusions forming an array.

47. (New) The fabricated microstructure of claim 41 wherein the protrusion is capable of providing a substantially normal adhesive force at a surface of between about 20 and 8,000 nano-Newtons.

48. (New) The fabricated microstructure of claim 41 wherein the protrusion is capable of providng a substantially parallel adhesive force at a surface of between about 5.00 and 2,000 nano-Newtons.

49. (New) The fabricated microstructure of claim 41 wherein the protrusion is capable of providing an adhesive force at a surface of between about 1.00 and 200 nano-Newtons.

50. (New) The fabricated microstructure of claim 41 wherein the flexible beam has a length of between about 1 and 5 centimeters, a width of between about 0.5 and 1 centimeter, and a thickness of between about 0.1 and 0.3 millimeters.